MiSTEM Network

3-P Learning and YPAR

The MiSTEM framework for high-quality STEM education is "3-P learning," which stands for problem, project-, and place-based learning. Problem- and project-based learning are both student-centred approaches focused on learning through experience. Place-based learning focuses these approaches on solving community problems. Youth-led participatory action research (YPAR) compliments 3-P learning.

Problem-Based Learning and YPAR

Problem-based learning originated in medical education and is a teaching technique by which students are presented problems to solve. Problem-based learning has since been broadly adopted in education. Students learn through efforts of trial and error as there is no single correct answer. In problem-based learning, like YPAR, students interrogate, collect information, propose solutions, and present their recommendations or conclusions. Facilitators of YPAR and educators who employ problem-based learning both serve as guides to learning and allow studentas to explore. Under a YPAR approach, students determine their research questions. Under a problem-based learning approach, an educator provides a research question to students.

THE PROBLEM-BASED LEARNING PROCESS

1. The problem is encountered first in the learning sequence, before any preparation or study has occurred.
2. The problem situation is presented to the student in the same way it would present in reality.
3. The student works with the problem in a manner that permits his ability to reason and apply knowledge to be challenged and evaluated, appropriate to his level of learning.
4. Needed areas of learning are identified in the process of work with the problem and used as a guide to individualized study.
5. The skills and knowledge acquired by this study are applied back to the problem, to evaluate the effectiveness of learning and to reinforce learning.
6. The learning that has occurred in work with the problem and the individualized study is summarized and integrated into the student's existing knowledge and skills.

Project-based Learning and YPAR

Project-based learning is a teaching method in which students learn by actively engaging in real-world and personally meaningful projects. Students work on a project over an extended period—from a week up to a semester—that engages them in solving a real-world problem or answering complex questions. Students demonstrate their knowledge and skills by creating a public product or presentation for a real audience. YPAR connects project-based learning with participatory decision-making that prioritizes student voice.

Place-based learning and YPAR

Place-based science education is fundamentally transdisciplinary and cross-cultural, fostering scientific communication practices needed to address existing and emerging problems while truly involving stakeholders from diverse backgrounds. YPAR compliments place-based education by reinforcing student voice in place-based problem-solving. Taken together, YPAR and place-based education can be part of a comprehensive, culturally responsive pedagogy to reach all students. Like YPAR, place-based education requires rethinking the ways schools use resources, going beyond textbook teaching, and fostering connections and relationships with students and community in relation to place. When developing a phenomenon-centered curriculum, community participants need to be authentically involved to bring local knowledge and practices into science learning. YPAR facilitates sustainability by fostering relationship-building between community participants, students, and teachers. Teachers need to collaborate with each other and community partners in participatory ways to integrate local learning contexts and resources into classroom-based learning.